Based on input from each company as well as informal pretesting, Field Research re-drafted the Non-Customer questionnaire and drafted the Matched Customer questionnaire. These forms were again submitted to both telephone companies for review and comment.

A third iteration of the Non-Customer form (and a second iteration of the Matched Customer form) were put together and pretested in four areas with high proportions of Blacks and four areas with high proportions of Hispanics.

Based on the pretest, the questionnaires were revised and submitted to both companies for review.

The questionnaires were then sent to a selected group of consumer and community leaders. Four meetings were held with the community leaders to get their reaction to, and gain their support for, the project. Many participants offered valuable suggestions which, to the extent possible, were incorporated into the final questionnaires.

Because a number of changes were made as a result of the meetings with consumer and community leaders, Field Research tested the revised questionnaires once more with known non-customers. The Clients also reviewed the revised questionnaires. A few further revisions were made on the basis of this final review process.

Once the questionnaires for the door-to-door survey were finalized, a Customer form was developed for use in the telephone survey among customers. Essentially, the telephone Customer questionnaire was designed to be the same as the Matched Customer questionnaire used in the door-to-door survey; however, some slight changes were needed to tailor it to the telephone approach.

Translations

The final questionnaires and screening interviews were given to translating services to be translated into Spanish, Chinese, Korean and Vietnamese. Each translation was reviewed by another translator plus two bilingual interviewers who work regularly on multi-language studies for Field Research. All four translators attended a session where they jointly reviewed each question to be sure that the translation would have the same meaning in English and that it would work in a survey setting.

B. Non-Customer Survey Method

Study Design Plan

The design plan called for interviews with a cross-section sample of about 500 non-customers in areas known to have low telephone penetration and a matched sample of 500 customers in those same areas. Each sample was divided evenly between GTE and Pacific Bell.

Low telephone penetration was defined as Block Clusters with less than 90% penetration according to the 1990 U.S. Census.

The number of interviews conducted is shown in Table A.1:

Table A.1
Total Number of Completed Interviews

	Non-Customers			Matched Customers		
	Total	GTE	PB	Total	GTE	PB
Total interviews in cross-section sample of low telephone penetration areas	<u>571</u>	<u>288</u>	<u>283</u>	<u>566</u>	<u>287</u>	<u>279</u>
Hispanic	347	202	145	347	203	144
Black	115	48	67	112	46	66
White	94	35	59	98	37	61
Asian/other	15	3	12	9	1	8

Sampling Procedures

The samples for this portion of the study were obtained from Equifax during the development phase. The procedures used to generate the samples are described below.

For the cross-section sample:

1. The universe for study was defined as the counties of: Alameda, Contra Costa, Fresno, Los Angeles, Orange, Sacramento, San Diego, San Francisco, and Santa Clara. Accordingly, Equifax developed a universe of all "Block Clusters" in these counties. (A Block Cluster is typically 6 to 8 city blocks in size.)

2. Using 1990 Census data, Equifax examined the telephone penetration levels for all Block Clusters in the defined universe and eliminated all with 90% or more telephone penetration.

3. The remaining universe was divided into two separate universes: one for GTE and one for Pacific Bell.

4. Within each universe, the total number of non-telephone households for each Block Cluster was calculated using this formula:

    Number of households times (100 minus telephone penetration) equals non-customer households

    Within each universe, the total number of non-customer households was determined and Block Clusters were ranked in descending order based on the estimated number of non-customer households in each.

5. It was decided that a total of 125 clusters would be needed for each Client. (Each "cluster" was anticipated to yield about two interviews with non-customers -- 125 times 2 equals 250 non-customer interviews per Client.)

6. An interval (N) was calculated by dividing the total population of non-telephone households by 125. This interval, expressed as X number of non-customer households, was applied to each universe, starting at a random starting point. This procedure assures that each Block Cluster is included in the sample in proportion to its non-customer population size (PPS). Clusters with large numbers of non-customers have a higher probability of being included than Block Clusters with fewer non-customers; some of the larger Block Clusters can appear more than once (multiple "hits").

7. Equifax then produced (a) maps showing the Block Clusters identified as Pacific Bell or GTE, (b) a hard copy listing of the Block Clusters for each Client showing the ethnic/racial make-up of the Block Cluster and (c) a diskette.

8. FRC put the information for each Block Cluster into a spreadsheet format to be used in making assignments to the interviewing subcontractors and controlling the interviewing in each cluster.

9.   FRC designated a starting point and route to follow within each Block Cluster.

Asian Augmentation

The original study design plan called for a minimum of 100 Non-Customer interviews among each of three Asian groups: Chinese, Korean and Vietnamese. (100 matched customers were also to be interviewed in each Asian group.)

Accordingly, Field Research asked Equifax to select, for each Asian group within each phone company, the 15 Block Clusters having the highest percentage of the desired Asian populations. In each of these Block Clusters, interviewers were to list whatever number of households was necessary to yield at least three non-customers in the Block Cluster (3 times 15 equals 45 per Client times 2 equals 90 for each Asian group). This plus the cross-section yields was expected to bring the total number of non-customer interviews with Chinese, Korean and Vietnamese to about 100.

As it happened, the above approach failed to identify any Vietnamese or Korean Block Clusters with 20% or more of the desired group. FRC pursued other options with Equifax in an effort to try to find areas with higher percentages of these Asian populations. None of these yielded Block Clusters that could be expected to yield high percentages of Asian non-customers. The results of this effort are described in Part 3 of the Non-Customer report.

Listing Households

For the Cross-section, interviewers listed 60 households (dwelling units) from each designated starting point within each Block Cluster. Interviewers made one callback to the area in an effort to determine whether or not there is a phone at the address listed.

Interviewers were given comprehensive instructions for how to list households. Copies of the instructions are included in Volume 3, Technical Appendix.

In brief, interviewers went to the designated starting points within the Block Cluster. This was a marked intersection. Proceeding clockwise from that marked intersection, they were instructed to skip the first two dwelling units and start their listing at the third dwelling unit from the intersection. They then listed every occupied dwelling unit going around the block in a clockwise fashion. If the original block did not yield 60 listings, they were instructed to use the alternate (adjacent) blocks in the order indicated on their Block Cluster Maps. (Field Research selected the primary and alternate blocks as well as the starting point within the cluster.)

Whenever the interviewer found a non-customer, he/she attempted to complete an interview at that address, making a total of up to four attempts to do so.

Upon completion of a non-customer interview, the interviewer completed an interview with the next available customer of the same ethnicity/race. (No callbacks were made to customer households.)

Respondent Selection Within Households

Within non-customer households, interviewers asked for an adult who "if you were to decide to have phone service, who would have the MOST TO SAY about the type of phone service you would get." Within Matched Customer households they asked for "the adult in this household who is most familiar with the phone bill."

Implementation

The door-to-door interviewing was subcontracted to vendors who specialized in door-to-door interviewing, and the majority of the work was subcontracted to ethnic minority vendors. Bilingual interviewers were assigned to Hispanic and Asian Block Clusters; Black interviewers were assigned to areas that have high concentrations of Blacks.

In addition to the materials needed to conduct the interviewing, interviewers carried with them:

a. an identifying "badge" with the name and logo of GTE or Pacific Bell
b. a letter of endorsement by community groups
c. a set of answers to frequently asked questions

Results of Household Listings

Table A.2 (on page A-9) shows the results of the household listing effort.

As shown, a total of 17,215 households were listed: 10,045 in GTE areas and 7,170 in Pacific Bell areas. (More listings were done in GTE areas because the original 125 GTE clusters failed to yield the desired number of non-customers and, especially, Black non-customers. Field Research selected 44 of the 125 GTE clusters to receive an additional 60 listings.

For Pacific Bell, 8 of the original 125 clusters were not used due to the following reasons: one cluster was found to be in GTE territory, one was in a rural area with too few households, two clusters were deemed too dangerous by the local field service, and four clusters were pulled by FRC due to poor interviewer performance as determined by verification. Due to the fact that four Pacific Bell clusters were pulled, one cluster was worked a second time. The second effort is considered supplemental.

Telephone penetration was determined for 82% of the households listed: 14,198 in total, 8,744 for GTE and 5,454 for Pacific Bell. These 14,198 households and their telephone service status were entered into a database for the purpose of monitoring change in telephone penetration over time.

)   )   )

Table A.2
Disposition of Household Listing

	GTE	PB
Total clusters	169	118
Cross-section	125	117
Supplemental	44	1
Total Households Listed	10,045	7,170
Average # households listed per cluster	59	61
Unable to determine if have phone	1,301	1,716
No one home	856	1,253
Refusal/can't determine if have phone	377	351
Communication barrier	22	29
Other (gate, dog, etc.)	46	83
Able to determine/contact made	8,744	5,454
Non-customers (total)	488	410
Interviewed	288	283
Not interviewed	200	127
Refused	185	108
No one home/no adult	6	10
Other	9	9
Customers	8,256	5,044
Interviewed	287	279
Not interviewed	7,969	4,765
% households where contact made that are non-customers	6%	8%
% of non-customers completing interview	59%	69%

94% of the GTE households and 92% of the Pacific Bell households for which it could be determined if they have telephone service or not are reported as having telephone service. This is HIGHER than the rates shown by the 1990 U.S. Census for these low telephone penetration areas -- the Census data for these areas shows 86% for GTE and 87% for Pacific Bell. There could be several reasons why this study shows HIGHER telephone penetration than the U.S. Census:

First, as was acknowledged from the outset, the U.S. Census is able to bring to bear more resources to obtain a complete enumeration of households -- it has better auspices, more resources, and more time.

Second, interviewers on this study were instructed that if they could not determine if the household had telephone service from an adult household spokesperson, they could use other techniques, e.g. next-door neighbors, responsible minors, observation. This may have tended to increase the customer count.

In any event, the objective of this study was NOT to measure telephone penetration. Thus, while non-customers may have been under-reported here, this does not threaten either of the primary objectives of this research: (1) to find a sample of non-customers and ask them a series of questions around the issues of affordability and reasons for not having telephone service and (2) develop a panel of customer and non-customer addresses so that changes in penetration rates could be monitored over time.

Statistical Weights

An equal number of interviews were conducted in GTE and Pacific Bell areas. This required that statistical weights be applied to the data to bring each Company's non-customers into proper proportion for looking at "total non-customer" data.

Also, as noted earlier, the original 125 GTE clusters failed to yield the desired number of non-customers and, especially, Black non-customers. 44 of GTE's original 125 clusters were selected to receive an additional 60 households listings. To assure enough GTE Black non-customers, this supplemental work focussed on clusters that had yielded a high percentage of Black non-customers. Statistical weights were needed to bring the supplemental interviews into their proper proportion.

Specifically, the following weights were applied:

1. Company weights: Using 1990 U.S. Census data, it was determined that Pacific Bell has 91% of the non-customers in low telephone penetration areas and GTE has 9%. This meant that the GTE data had to be "weighted down" and the Pacific Bell data had to be "weighted up".

2. Fine-tuning for County distribution: Using the results from the original 125 GTE and 117 Pacific Bell clusters,

)   )   )

the proportions of non-customers in each of the Counties was determined. The total data (supplemental interviews included) were weighted to reflect these County distributions.

3. Using the results from GTE's original 125 clusters, the percentages of Hispanics, Blacks, Whites and Asian/Other were determined. The total data (supplemental interviews included) were weighted so that each ethnic/racial group would be included in its proper proportion to the GTE non-customer total.

The distributions to which the data were weighted and the weights applied are shown in Table A.3 below:

Table A.3

Weighting Matrix: Non-Customer Survey

	GTE (9.0%)	Pacific Bell (91.0%)					
	Los Angeles	Los Angeles	Orange	Bay Area[1]	San Diego	Fresno	Sacramento
Total	9.0	38.5	10.4	12.3	18.3	6.5	5.0
Hispanic							
Number of interviews	202	56	28	18	28	13	2
Proportion of universe	6.2	20.1	10.0	3.6	10.2	4.7	0.7
Weight assigned	.175	2.049	2.039	1.142	2.080	2.064	1.999
Black							
Number of interviews	48	31	0	22	6	2	6
Proportion of universe	1.6	11.2	0	2.1	2.2	0.7	2.2
Weight assigned	.190	2.063	0	.545	2.094	1.999	2.094
White							
Number of interviews	35	19	1	14	16	3	6
Proportion of universe	1.1	6.9	0.4	5.1	5.9	1.1	2.1
Weight assigned	.179	2.074	2.284	2.080	2.106	2.094	1.998
Asian/other							
Number of interviews	3	1	0	11	0	0	0
Proportion of universe	0.1	0.3	0	1.5	0	0	0
Weight assigned	.190	1.713	0	.779	0	0	0

[1]For purposes of this study, Bay Area includes the following counties: Alameda, Contra Costa, San Francisco and Santa Clara.

Interviewing Procedures: Door-to-Door

Interviewing was conducted door-to-door. Field Research subcontracted all of the door-to-door interviewing to vendors who could cite specific experience in doing this type of work. Most of the work was done by ethnic minority vendors. Because the ethnicity/racial make-up of each cluster was known, it was possible to match the ethnicity/race of the interviewer to the area. In many cases, two interviewers worked a cluster and often the team included a Black and a bilingual Hispanic. In some cases, a person from the local neighborhood was used to help in getting cooperation.

The vendors were permitted to offer respondents a $5 cooperation fee for completing the interview. Some vendors elected to do so; others did not.

Each interviewer attended a comprehensive briefing session on the proper administration of the survey. The questionnaires were reviewed by the local supervisors as the work progressed.

Each interviewer and each vendor received a set of comprehensive written instructions. These are included in Volume 3, Technical Appendix.

Field Research Role

Field Research project people led the initial briefings and remained in daily touch with the vendors to monitor their progress. Where required, Field Research sent its own project people to assist the local vendors in checking the work, making the assignments and so on.

Validation

Each vendor was responsible for validating a portion of each interviewer's work. Most often, this involved going back out into the cluster to check that the interviewer had done the listings properly. It also included checks with a sample of the Matched Customers who could be reached by phone.

In one instance, Field Research detected a problem with one of the vendor's work. Field Research had all of the clusters validated by sending someone into the areas. It was found that improper procedures were used in several Block Clusters. Interviews from these clusters that failed the verification were replaced by having someone rework the areas.

)   )   )

Field Dates: Door-to-Door

Interviewing for the door-to-door survey started on September 14, 1993 and was completed on October 31, 1993.

C. Customer Survey Method

The design plan for the Customer Survey called for:

(A)   Cross-section samples of GTE and Pacific Bell residential customers
(B)   Cross-section samples of GTE and Pacific Bell ULTS subscribers
(C)   Cross-section samples of GTE and Pacific Bell low income customers, defined as ULTS qualified

The Residential Cross Section and ULTS Subscriber cross-sections each were expected to yield some interviews with the various ethnic/racial groups identified for study. Additional interviews were conducted as necessary to yield a minimum of 300 interviews among each of these ethnic/racial groups:

Hispanic customers
Black customers
Chinese customers
Korean customers
Vietnamese customers
Low income seniors, ULTS qualified (age 60 or over)

Total Numbers of Interviews Conducted

Table A.4, following, shows the number of COMPLETED INTERVIEWS from each of the various samples used in the overall study design plan. Using a statistical weighting procedure, the various samples were combined to provide the total numbers of interviews with the various special subgroups, e.g. Hispanics, Blacks, and Low Income (ULTS qualified) customers. (See Statistical Weighting Procedures, page A-20.)

Table A.4
Total Number of Completed Interviews

	Total	GTE	PB
Residential cross-section sample	1,288	651	637
ULTS subscriber sample	694	313	381
Low income (ULTS qualified) sample	472	223	249
Special samples (to yield 300 in each cell of interest)			
Black augment	169	110	59
Chinese augment	283	143	140
Korean augment	300	150	150
Vietnamese augment	288	148	140
Low income senior augment	162	79	83
Total interviews completed	3,656	1,817	1,839

Sampling Methodology

The samples were drawn by GTE and Pacific Bell using systematic random sampling procedures, i.e. every Nth listing in the universe. These procedures allow for the data to be projected to the total universe within stated degrees of statistical precision. Field Research specified how the samples were to be drawn and worked closely with each company's data staff to be sure that the samples were drawn in accordance with its specifications.

The methodology for each sample is described below:

Cross-section samples of residential customers: These samples were drawn from the entire universe of each company's residential customers in California using systematic random sampling procedures, i.e. calculating an interval (N) by dividing the total number of residential listings by the number of listings needed and then, starting at a random point in the universe, taking every Nth listing.

)   )   )

Cross-section of ULTS Subscribers: Each company drew a systematic random sample of its ULTS subscribers following the same procedures, i.e. calculating an interval (N), finding a random start point in the total universe of ULTS subscribers and taking every Nth listing to yield the desired number of listings.

Two Cross-sections of Low Income Customers: (1) Low Income Cross Section and (2) Low Income Seniors: For GTE, the samples were drawn from listings in wire centers known to have 50% or more households with incomes of less than $25,000. For Pacific Bell, the samples were drawn from listings in zip code areas known to have 50% or more households with incomes of less than $25,000. Using these listings, Field Research conducted telephone screening interviews to find households that qualify.

Cross-section of Black Households: GTE identified wire centers and Pacific Bell identified zip code areas in which 30% or more of the households had the desired characteristic. The samples were drawn from these universes using systematic sampling techniques. Field Research conducted telephone screening calls to find customers with the desired characteristic.

Cross-section of Asian Customers: GTE was able to develop a universe of Asian surname customers; the Asian samples were drawn from this universe using systematic random sampling methods. Pacific Bell drew Asian samples by identifying zip codes in which 30% or more of the households had the desired characteristic. In both cases, telephone screening interviews were conducted to find customers with the desired characteristic.

Sample Implementation

In order to ensure that a sufficient number of listings would be available to complete the desired quotas, FRC asked for considerably more listings than it anticipated using. Thus, when the samples were received from GTE and Pacific Bell, FRC drew a sample of each sample using a systematic random procedure, that is, every Nth listing.

For the Pacific Bell Asian samples, only persons who had Korean, Chinese, or Vietnamese surnames were used. The Korean, Chinese, and Vietnamese interviewers went through the samples received from Pacific Bell and selected all those customers having the desired Asian (Chinese, Korean, or Vietnamese) surname. Then, FRC drew the required number of listings by applying a standard interval (N) to each Asian surname group.

Interviewers made up to four attempts in total, on different days and at different times of day, to complete an interview with each household. Each time an interviewer attempted an interview (dialed a number), he/she recorded the time, the day and the result of the call. Results of the total calling effort made to implement the GTE and Pacific Bell samples are summarized on the following tables.

	Cross-Section	ULTS	Low Income	Low Income Senior	Black	Chinese	Korean	Viet-namese
Total listings called one or more times	2,387	1,028	1,584	1,234	1,622	354	319	264
Not in service	233	145	236	55	307	20	23	12
Business	86	19	33	15	19	5	2	2
Total usable numbers	2,068	864	1,315	1,164	1,296	329	294	250
No contact made	831	310	478	565	262	96	43	34
No answer*	523	174	276	383	126	34	20	10
Busy*	24	12	17	25	15	(b)	(b)	(b)
Eligible respondent not available	176	70	105	117	71	14	9	13
Communications barrier	53	31	56	33	34	19	6	8
Other (a)	55	23	24	7	16	29	8	3
Contact made	1,237	554	837	599	1,034	233	251	216
Refused before eligibility determined	514	194	352	294	239	39	32	15
Refused after eligibility determined	72	47	37	20	16	39	38	28
Completed screener	651	313	448	285	779	155	181	173
Ineligible	0	0	225	206	669	12	31	25
Completed interview	651	313	223	79	110	143	150	148
% of usable numbers yielding completed screener	31%	36%	34%	24%	60%	47%	62%	69%
% of contacts yielding completed screener	53%	56%	54%	48%	75%	67%	72%	80%

*   *After 4 attempts*
(a)   *Typically includes duplicates, eligible persons away long term (on vacation), computer access numbers and answering services*
(b)   *"No answer" and "Busy" are combined in this table for Chinese, Korean and Vietnamese samples. The combined "No answer" and "Busy" figure is displayed in the "No answer" row.*

Table A.2
Disposition of Samples: Pacific Bell

	Cross-Section	ULTS	Low Income	Low Income Senior	Black	Chinese	Korean	Viet-namese
Total listings called one or more times	2,370	1,141	1,257	1,326	399	272	377	252
Not in service	140	94	101	119	33	5	21	13
Business	73	14	24	45	9	4	5	2
Total usable numbers	2,157	1,033	1,132	1,162	357	263	351	237
No contact made	917	392	459	462	161	64	47	34
No answer*	564	186	279	280	112	23	19	18
Busy*	23	11	19	16	2	(b)	(b)	(b)
Eligible respondent not available	188	93	96	64	34	27	3	10
Communications barrier	76	59	41	89	7	5	15	3
Other (a)	66	43	24	13	6	9	10	3
Contact made	1,240	641	673	700	196	199	304	203
Refused before eligibility determined	520	227	246	241	56	27	22	4
Refused after eligibility determined	83	33	37	40	3	25	55	40
Completed screener	637	381	390	419	137	147	227	159
Ineligible	0	0	141	336	78	7	77	19
Completed interview	637	381	249	83	59	140	150	140
% of usable numbers yielding completed screener	30%	37%	34%	36%	38%	56%	65%	67%
% of contacts yielding completed screener	51%	59%	58%	60%	70%	74%	75%	78%

*   *After 4 attempts*
(a)   *Typically includes duplicates, eligible persons away long term (on vacation), computer access numbers and answering services*
(b)   *"No answer" and "Busy" are combined in this table for Chinese, Korean and Vietnamese samples. The combined "No answer" and "Busy" figure is displayed in the "No answer" row.*

Sample Selection within Households

Within each household, interviewers asked for "the adult in this household who is most familiar with the phone bill."

Non-English Speaking Customers

The questionnaires were translated into Spanish, Chinese, Korean, and Vietnamese. Copies of the translations are included in Volume 3, Technical Appendix.

For the Asian samples, only interviewers who spoke those languages did the interviewing. In this way they could quickly establish which language the customer preferred (i.e., English or the native language) and interview the person in that language.

For the other samples, if the interviewer encountered a language barrier, an attempt was made to find out which language was needed. Then an interviewer speaking the specified language recontacted the respondent.

Table A.6 below shows the number of interviews completed and tabulated that were conducted in languages other than English.

Table A.6
Language of Interview

		Asian samples		
	Hispanic	Chinese	Korean	Viet- namese
Total interviewed	766	317	306	308
Interviewed in English	322	131	17	12
Interviewed in native language	444	186	289	296

Interviewing Procedures

Except for the Asian samples, all of the interviewing was conducted from FRC's central location telephone interviewing facilities in San Francisco. The Asian samples were subcontracted to an ethnic minority vendor.

)   )   )

Interviewers made a total of four attempts by telephone at each household to complete an interview. These attempts were made on different dates and at different times of day to maximize the chances of finding an eligible adult at home. Interviewing was limited to 3 to 9 p.m. (weekdays) and 10 a.m. to 7 p.m. (weekends).

The interviews were conducted by persons trained in basic interviewing skills including how to approach respondents, minimize refusals, ask questions and record answers. Each interviewer also received a comprehensive briefing on this particular project.

FRC and the Asian vendor followed standard quality control procedures to assure high interviewer performance on this project. These procedures involve periodic monitoring of each interviewer's work by full-time supervisors to ensure that standards are consistently maintained and that the work is being performed properly. This basic system is supplemented by several further controls:

o   Each interviewer's first few interviews are carefully reviewed by supervisors to spot any errors, misunderstandings or problems. The results are fed back quickly to the interviewer for clarification, discussion, correction and any other instructions.

o   As the interviews are completed, the supervisory staff checks the completed questionnaires for completeness, correctness and necessary editing. Problems are reviewed with the interviewer who did the work.

o   Each interviewer's contact record sheets are reviewed at the end of each calling period to check on refusals and completion rates. If it appears that some interviewers are not able to complete the interviewing tasks as specified, or are encountering an unusually high proportion of refusals, those interviewers are either given further instruction or are removed from the project.

Interviewing Method

Interviews in English and Spanish were conducted using Computer Assisted Telephone Interviewing (CATI) software. The questionnaires are programmed so that each question appears on the monitor and the interviewer enters the answers directly into the computer system. The Asian samples, as well as any Asians encountered in the cross-sections who required an Asian language, were conducted using standard paper/pencil techniques.

Data Processing

The completed CATI and paper/pencil questionnaires were checked in, and, as necessary, edited for completeness and accuracy.

The FRC coding staff then sampled at least 20% of the responses to the free-response questions. Using the sample responses, the Project Director and Coding Supervisor established code categories to permit detailed coding and quantification of responses. Trained coders, working under direct supervision of the Coding Supervisor, assigned each verbatim answer to code categories.

For the Asian (paper/pencil) interviews, data entry personnel keyed the information from the edited and coded questionnaires into the computer. The data were combined with the data from the CATI interviews (all non-Asian interviews) and submitted to FRC's computerized cleaning program which makes logic checks to detect interviewing, coding or data entry inconsistencies. Any inconsistencies were resolved through individual inspection of and comparison with the original questionnaires.

Statistical Weighting Procedures

The study design plan called for combining the Residential, ULTS and Low Income cross-section samples with the minority cross-section samples to yield the desired number of interviews with each group of interest.

Since certain groups were, in effect, oversampled (e.g. low income customers, Blacks, low income seniors, ULTS subscribers), weights had to be applied to bring each group into its proper proportion for looking at "total" findings. The weighting also had to include a correction for the fact that each sample was divided equally between GTE and Pacific Bell.

Specifically, this is how the weighting was done: First, a decision was made to exclude the three Asian special samples and the special Low Income Senior sample from the weighting. Since these represent only a very small proportion of the total customer base, they would have to be "weighted down" to a very large extent. These groups were tabulated separately without weights. (Each of the three groups of Asians and Low Income Seniors are included in the total findings in proportion to how they were encountered in the various cross-section samples used for the total findings. Thus, each group is represented in the total in proportion to its size in the customer base.)

Thus, the weighting system included all of these samples:

    Residential cross-section
    ULTS Subscribers
    Special Low Income sample
    Special Black sample

In order to combine these various samples and assure that each group is included in its proper proportion when examining total findings, a four stage weighting system was used.

)   )   )

1. Company Weight

The company weight corrected for the fact that equal numbers of interviews were conducted within each company's service area. The weights used were based on each company's estimate of its total number of residential customers. According to data supplied by GTB and Pacific Bell, GTB has 21% of customers and Pacific Bell has 79% of customers in the survey universe.

2. ULTS Subscriber Weight

Within each company, ULTS subscribers and non-subscribers were assigned weights to bring each group into its proper proportion. The distribution was determined by examining the proportions of ULTS subscribers found among the total Residential Cross-section samples (not just those interviewed) supplied to Field Research. Table A.7 shows the ULTS distribution for each company.

Table A.7
ULTS Distribution

	GTB	Pacific Bell
ULTS Subscriber	11.5%	21.0%
Non-Subscriber	88.5	79.0
	100.0	100.0

3. Ethnicity/Race Weight

The third stage of weights brought Blacks and Hispanics into their proper proportion. This weight was based on respondent data, specifically the ethnic/racial distributions found among ULTS subscribers and non-subscribers within each company (four groups). Table A.8 shows the ethnic/racial distribution among ULTS subscribers and non-subscribers by company.

Table A.8
Ethnicity/Race Distribution

	GTE		Pacific Bell	
	ULTS	Non ULTS	ULTS	Non ULTS
Hispanic	38.8%	21.3%	40.0%	11.9%
Black	7.2	3.4	9.9	8.8
White/other	54.0	75.3	50.1	79.3
	100.0	100.0	100.0	100.0

4. Low Income (ULTS qualified) Weight

Finally, a fourth stage of weights brought the low income groups into their proper proportion. This, too, used data from the survey, specifically the percentages who (1) qualify and have ULTS, (2) qualify and don't have ULTS or (3) don't qualify/can't determine. Table A.9 shows this distribution.

)
)
)

Table A.9
Distribution: Low Income (ULTS Qualified) Weight

	GTE		Pacific Bell	
	ULTS	Non ULTS	ULTS	Non ULTS
Hispanic	**38.8%**	**21.3%**	**40.0%**	**11.9%**
Qualify/have	28.3	--	32.5	--
Qualify/don't have	--	7.1	--	2.9
Don't qualify/can't determine	10.5	14.2	7.5	9.0
Black	**7.2**	**3.4**	**9.9**	**8.8**
Qualify/have	4.2	--	6.0	--
Qualify/don't have	--	0.7	--	2.6
Don't qualify/can't determine	3.0	2.7	3.9	6.2
White/other	**54.0**	**75.3**	**50.1**	**79.3**
Qualify/have	34.8	--	33.0	--
Qualify/don't have	--	7.3	--	6.4
Don't qualify/can't determine	19.2	68.0	17.1	72.9
	100.0	100.0	100.0	100.0

Using the above data, a 24 cell matrix was constructed showing how the total customer base distributes on these variables. The various samples were combined and weights were applied to the data to bring each group into the proportions shown on the matrix on the following page, Table A.10.

	GTE (21.0%)		Pacific Bell (79.0%)	
	ULTS	Non ULTS	ULTS	Non ULTS
Total	2.398	18.599	16.601	62.402
Hispanic - qualify/have				
Number of interviews completed	146	0	263	0
Proportion of universe	.68	0	5.40	0
Weight assigned	.122	0	.538	0
Hispanic - qualify/don't have				
Number of interviews completed	0	79	0	42
Proportion of universe	0	1.32	0	1.78
Weight assigned	0	.438	0	1.114
Hispanic - don't qualify/can't determine				
Number of interviews completed	46	83	53	54
Proportion of universe	.25	2.64	1.24	5.62
Weight assigned	.144	.834	.613	2.731
Black - qualify/have				
Number of interviews completed	53	0	74	0
Proportion of universe	.10	0	1.00	0
Weight assigned	.050	0	.356	0
Black - qualify/don't have				
Number of interviews completed	0	39	0	42
Proportion of universe	0	.13	0	1.65
Weight assigned	0	.089	0	1.028
Black - don't qualify/can't determine				
Number of interviews completed	22	61	34	50
Proportion of universe	.07	.49	.65	3.84
Weight assigned	.086	.213	.501	2.014
White/other - qualify/have				
Number of interviews completed	195	0	223	0
Proportion of universe	.83	0	5.48	0
Weight assigned	.112	0	.645	0
White/other - qualify/don't have				
Number of interviews completed	0	80	0	44
Proportion of universe	0	1.35	0	3.98
Weight assigned	0	.443	0	2.371
White/other - don't qualify/can't determine				
Number of interviews completed	88	405	100	347
Proportion of universe	.46	12.66	2.83	45.53
Weight assigned	.137	.820	.743	3.442

Field Dates

Interviewing for the Customer Survey started on September 20, 1993 and was completed on October 28, 1993.

D. Reliability of the Findings

How Weighting Affects Tests for Statistical Reliability

In the statistical tabulations, the unweighted base (i.e. the actual number of persons upon whom the percentages are based) is shown; the percentage distributions, however, are based on weighted data. The Pacific Bell customer data received a weight of about 2 in order to correct for the fact that the samples were equally divided between Pacific Bell and GTE, but in the real world, there are almost four times as many Pacific Bell customers as GTE.

Thus, while the unweighted base is shown, some adjustment has to be made for the fact that the percentages are weighted. As a rough rule of thumb, when examining total findings where the findings for GTE and Pacific Bell are combined, one can divide the unweighted bases by two to provide a better estimate of the "base" or N (number) to be used in determining the amount of sampling error in these statistics. This is because the Pacific Bell findings were given a weight of roughly 1.5 to 3.0 (average 2.0 across groups) to bring them into their proper proportion to the total. For Pacific Bell and GTE findings, one can use the unweighted base to calculate the sampling error.

Statistical Reliability

In any survey based on a sampling, there is some unreliability introduced into the data by the process of sampling itself. When the sample has been drawn according to strict random processes, it is possible to apply probability principles to determine the potential range of such error. While survey samples of human populations rarely, if ever, meet all of the criteria theoretically required for the application of these principles, it is customary to use them as an approximation of error that is introduced as a result of sampling. The table below shows the range of error that is associated with samples of various sizes, assuming the use of the 95% confidence level which is customary for surveys of these types.

Sampling Tolerances For Samples Of 1400 To 50
(at the 95% level of confidence)

Base Size (N):	Percentage Division of Replies:		
	90/10	75/25	50/50
1400	± 2%	± 2%	± 3%
1200	± 2%	± 2%	± 3%
1000	± 2%	± 3%	± 3%
800	± 2%	± 3%	± 3%
600	± 2%	± 4%	± 4%
400	± 3%	± 4%	± 5%
300	± 3%	± 5%	± 6%
200	± 4%	± 6%	± 7%
150	± 5%	± 7%	± 8%
100	± 6%	± 9%	± 10%
50	± 8%	± 12%	± 14%

)

)

)

A guide to the size of the difference needed to be significant at the 95% level of confidence when one is making comparisons between two groups is provided below:

**Difference Required Between Two Samples
to be Significant at the 95% Level of Confidence**

Percentage Division of Replies:

Base Size (N):	90/10	75/25	50/50
2400 and 2400	1%	2%	2%
1400 and 1400	3%	4%	4%
1200 and 1200	3%	4%	4%
1000 and 1000	3%	4%	4%
400 and 400	4%	6%	7%
300 and 300	5%	7%	8%
200 and 200	6%	8%	10%
150 and 150	7%	10%	11%
100 and 100	8%	12%	14%
50 and 50	12%	17%	20%